

**THAT WHICH IS CLAIMED IS:**

1. A multimode wavelength division  
multiplexing (WDM) network transceiver comprising:  
a plurality of optical transmitters  
transmitting optical communications signals along  
5 respective signal paths;

a multiplexer operatively connected to each  
optical transmitter for receiving the optical  
communications signals and multiplexing the optical  
communications signals into a multimode wavelength  
10 division multiplexed optical communications signal  
having a wavelength channel spacing less than about  
1,000 gigahertz;

a demultiplexer for receiving a multimode  
wavelength division multiplexed optical communications  
15 signal and demultiplexing the signal into a plurality  
of demultiplexed optical communications signals; and

a plurality of optical receivers each matched  
with a respective optical transmitter for receiving and  
detecting the demultiplexed optical communications  
20 signal.

2. A network transceiver according to  
Claim 1, wherein said optical receiver comprises a PIN  
detector.

3. A network transceiver according to  
Claim 2, wherein said PIN detector comprises an InGaAS  
PIN detector.

4. A network transceiver according to  
Claim 2, wherein said optical receiver further  
comprises a transimpedance amplifier.

U.S. PAT. & TM. OFFICE

Sub  
A1

6. A network transceiver according to Claim 4, wherein said APD comprises an InGaAS APD detector.

8. A network transceiver according to Claim 7, wherein said optical transmitter comprises a thermoelectric cooler and controller circuit.

10. A network transceiver according to Claim 9, and further comprising a single mode optical fiber defining a signal channel between said attenuator and said optical transmitter and an optical fiber defining signal channel between said attenuator and said multiplexer.

11. A network transceiver according to Claim 1, and further comprising a transceiver electrically connected to each optical transmitter and matched optical receiver for receiving and transmitting an optical communications signal, wherein said transceiver is operative at a first wavelength band and

said optical transmitter and matched optical receiver are operative at a second wavelength band.

12. A network transceiver according to Claim 11, wherein said second wavelength band is upconverted from said first wavelength band.

13. A network transceiver according to Claim 1, and further comprising a physical sublayer chip circuit operatively connected to a plurality of optical transmitters and matched optical receivers.

14. A network transceiver according to Claim 13, and further comprising an electrical interface operatively connected to said physical sublayer chip circuit.

15. A network transceiver according to Claim 14, wherein said electrical interface comprises a plurality of RJ-45 jacks for Ethernet 1000 Base-T connection.

16. A network transceiver according to Claim 1, and further comprising a serial/deserializer (SERDES) circuit operatively connected to an optical transmitter and matched optical receiver, a switch circuit operatively connected to said serial/deserializer circuit, and a physical sublayer chip circuit and electrical interface operatively connected to said switch circuit.

17. A network transceiver for processing optical communications signals into a wavelength division multiplexed optical communications signal comprising:

an optical receiver operatively connected to  
25 the demultiplexer and each respective transceiver for  
receiving and detecting a demultiplexed optical  
communications signal and generating a signal to a  
respective transceiver to be output as an optical  
communications signal contained within the first  
30 wavelength band.

19. A network transceiver according to Claim 18, wherein said PIN detector comprises an InGaAS PIN detector.

20. A network transceiver according to Claim 18, wherein said optical receiver further comprises a transimpedance amplifier.

21. A network transceiver according to Claim 17, wherein said optical receiver comprises an Avalanche Photo Diode (APD).

22. A network transceiver according to Claim 21, wherein said APD comprises an InGaAS APD detector.

23. A network transceiver according to Claim 17, wherein said optical transmitter comprises a distributed feedback laser.

24. A network transceiver according to Claim 17, wherein said optical transmitter comprises a thermoelectric cooler and controller circuit.

25. An network transceiver according to Claim 17, wherein each transmitter is operative for transmitting the optical communications signal contained within a second wavelength band onto a single  
5 mode fiber output.

26. A network transceiver according to Claim 17, and further comprising a single mode optical fiber defining a signal channel between said attenuator and said optical transmitter and an optical fiber  
5 defining a signal channel between said attenuator and said wavelength division multiplexer.

✓

28

29.

✓ a- p

5

15

20

25

30. A multiport network hub according to Claim 29, wherein said optical receiver comprises a PIN detector.

31. A multiport network hub according to Claim 30, wherein said PIN detector comprises an InGaAS PIN detector.

32. A multiport network hub according to Claim 29, wherein said optical receiver comprises an Avalanche Photo Diode (APD).

33. A multiport network hub according to Claim 32, wherein said APD comprises an InGaAS detector.

34. A multiport network hub according to Claim 30, wherein said optical receiver further comprises a transimpedance amplifier.

35. A multiport network hub according to Claim 29, wherein said optical transmitter comprises a distributed feedback laser.

36. A multiport network hub according to Claim 29, wherein said optical transmitter comprises a thermoelectric cooler and controller circuit.

37. A multiport network hub according to Claim 29, wherein said network interface is operative with an Ethernet infrastructure.

38. A multiport network hub according to Claim 37, wherein said network interface comprises a plurality of RJ-45 jacks.

39. A multiport network hub according to Claim 29, and further comprising a serial/deserializer (SERDES) interface circuit operatively connected between each of an optical transmitter and matched optical receiver and the switch circuit.

40. A multiport network hub according to Claim 29, wherein said network interface further comprises octal physical sublayer chip circuits.

41. A multiport network hub according to Claim 29, wherein a channel spacing is less than about 1,000 gigahertz.

42. A method of expanding the bandwidth of an existing optical communications network comprising the steps of:

transmitting optical communications signals from a plurality of optical transmitters positioned along respective signal channels;

multiplexing the optical communications signals into a multimode wavelength division multiplexed optical communications signal having a channel spacing less than about 1,000 gigahertz;

demultiplexing a multimode wavelength division multiplexed optical communications signal within a demultiplexer into a plurality of optical communications signals along respective signal channels; and

receiving and detecting the plurality of optical communications signals within optical receivers that are respectively matched with optical transmitters.



44. ~~A method according to Claim 43, wherein the PIN detector comprises an InGaAS detector.~~

45. A method according to Claim 42, wherein the step of transmitting comprises the step of generating an optical communications signal with a distributed feedback laser.